



# UNITED STATES PATENT AND TRADEMARK OFFICE

9/21  
UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/620,461	07/17/2003	Takeshi Misawa	0649-0901P	9184
2292	7590	08/12/2004	EXAMINER	
BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747			MAGEE, THOMAS J	
		ART UNIT	PAPER NUMBER	
			2811	

DATE MAILED: 08/12/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/620,461	MISAWA, TAKESHI	
	<b>Examiner</b>	<b>Art Unit</b>	
	Thomas J. Magee	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1) Responsive to communication(s) filed on 19 May 2004.  
 2a) This action is **FINAL**.                            2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4) Claim(s) 1-10 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-10 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date: _____
3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date: _____	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
	6) <input type="checkbox"/> Other: _____

## DETAILED ACTION

### ***Claim Rejections – 35 U.S.C. 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1 – 3, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Malinovich et al. (US 6,168,965 B1) in view of Strnad (US 6,338,974 B1).

4. Regarding Claims 1 and 3, Malinovich et al. disclose a semiconductor device comprising a semiconductor substrate (300) (Figure 4(A)) on which a photoelectric converting portion (100) is formed (CCD, CMOS image sensors) (Col. 1, lines 10 – 19) (Col. 11, lines 5 – 9).

Malinovich et al. do not disclose the presence of a “light shading” (or diffuse) region, whereby incoming light is “reflected” (scattered) from the rear surface of the semiconductor. Strnad discloses (Col. 1, line 63 through Col. 2, line 10) the use of mechanical thinning of the semiconductor substrate at the rear surface of the device structure to produce a series of “peaks” and “valleys” (Figures 2 and 4), wherein radiation is scattered away (or “shaded”) from the device at the front surface (Col. 2, lines 8 – 9) by the rough features. In the imaging device of Strnad, the scattering away or “shading” produces a image degrading from the image formed at the front surface and transmitted to the back. It would then have been

obvious to one of ordinary skill in the art at the time of the invention to combine the back surface grind techniques of Strnad with the device structure of Malinovich et al. to obtain an optical device with a “light shading” or diffuse scattering layer to avoid spurious signals being reflected back into the sensor at the front surface.

5. Regarding Claim 2, Malinovich et al. disclose (Col. 8, lines 4 – 12) that the package comprises a wiring board (printed circuit board) with a connecting terminal on the rear surface.

6. Regarding Claim 9, Malinovich et al. disclose a method for manufacturing a semiconductor device comprising forming a plurality of devices (Col. 6, lines 5 –7) (Figure 3A) (100) on the front surface of a semiconductor substrate, with a bonding step for bonding a wiring board on the rear surface of the substrate (Col. 8, lines 8 – 12) and a separating step for separating individual devices (Col. 7, lines 20 – 25) (Figure 4D).

Malinovich et al. do not disclose the use of a grinding step for forming rough surface on the rear surface of the semiconductor substrate. Strnad discloses (Col. 3, lines 42 – 52) the use of backside grinding to form a rough surface (Figure 4) at the rear surface of the substrate.

It would then have been obvious to one of ordinary skill in the art at the time of the invention to combine the back surface grind techniques of Strnad with the device structure of Malinovich et al. to obtain an optical device with a “light shading” or diffuse scattering layer to avoid spurious signals being reflected back into the sensor at the front surface.

7. Claims 4, 5, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Malinovich et al. in view of Strnad, as applied to Claims 1 – 3, and further in view of Wheatley et al. (US 5,122,905).

8. Regarding Claims 4 and 5, Malinovich et al. do not disclose the presence of one or more “light shading films having different refractive indices and formed on the rear surface of the substrate, corresponding to the photoelectric converting portion. Wheatley et al. disclose a multilayered film body (Figure 2) in which the refractive index difference between the first two layers is 0.03, and arranged such that at least 30% of the incident light is reflected, producing a diffuse or shaded surface. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the multilayered structure of Wheatley et al. at the back surface of the device of Malinovich et al. to produce a device with a diffuse or light shaded region at the rear of the device within regions of the photo electric converting portion to avoid spurious signals in the sensor.

9. Regarding Claim 8, as discussed above, Malinovich et al. do not disclose the presence of a light shading layer at the rear surface of the semiconductor substrate. Wheatley et al. disclose a layer structure at the rear surface (Col. 2, lines 22 – 47) that functions as a “light shading” (diffuse) layer. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine Wheatley et al. with Malinovich et al. to obtain a diffuser (light shading) layer at the rear surface of the device to reduce spurious coupling into the

sensor.

10. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Malinovich et al. in view of Strnad., as applied to Claims 1 – 3, and further in view of Fjelstad (US 6583444 B2).

11. Regarding Claim 6, Malinovich et al. do not disclose that the wiring board is connected to the substrate through a light-shading resin material. Fjelstad discloses that a light sensitive device is contained using an epoxy resin (Col. 7, lines 33 – 38) that is “opaque” (Col. 7, lines 43 – 45) to visible light, wherein the resin serves as a light-shading material. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine Fjelstad with Malinovich et al. to obtain a resin adhesive material to attach the substrate and circuit board together.

12. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Malinovich et al. in view of Strnad., as applied to Claims 1 – 3, and further in view of Tamaki (US 5,523,174).

13. Regarding Claim 7, Malinovich et al. do not disclose that the surface of the wiring board is roughened. Tamaki discloses (Figure 2) that the surface of the printed circuit board is roughened to improve adhesion at the surface. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine Tamaki et al. with Malinovich et al. to obtain an increased bonding at the interface of the board and the substrate.

14. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Malinovich et al. in view of Fjelstad.

15. Regarding Claim 10, Malinovich et al. disclose a method for manufacturing a semiconductor device comprising the steps of forming a plurality of devices (Col. 6, lines 5 –7) (Figure 3A) (100) on the front surface of a semiconductor substrate, and a separating step for separating individual devices (Col. 7, lines 20 – 25) (Figure 4D).

Malinovich et al. do not disclose the use of a light shading adhesive for bonding a wiring board on the rear surface of a semiconductor device, wherein the adhesive suppresses light “reflected” (scattered) from the semiconductor rear surface. Fjelstad discloses that a light sensitive device is contained using an epoxy resin (Col. 7, lines 33 – 38) that is “opaque” (Col. 7, lines 43 – 45) to visible light, wherein the resin serves as a light-shading material. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine Fjelstad with Malinovich et al. to obtain a resin adhesive material to attach the substrate and circuit board together.

### ***Response to Arguments***

16. Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusions***

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to **Thomas Magee**, whose telephone number is **(571) 272-1658**. The Examiner can normally be reached on Monday through Friday from 8:30AM to 5:00PM (EST). If attempts to reach the Examiner by telephone are unsuccessful, the examiner's supervisor, **Eddie Lee**, can be reached on **(571) 272-1732**. The fax number for the organization where this application or proceeding is assigned is **(703) 872-9306**.

Thomas Magee  
July 29, 2004



EDDIE LEE  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800